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**GOVERNMENT NOTICES • GOEWERMENTSKENNISGEWINGS**

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**DEPARTMENT OF WATER AND SANITATION****NO. 202****03 MARCH 2017**

INVITATION TO SUBMIT WRITTEN COMMENTS IN TERMS OF SECTION 110 OF THE NATIONAL WATER ACT 1998 (ACT 36 OF 1998) ON THE PROPOSED ZALU DAM AND THE ENVIRONMENTAL IMPACT ASSESSMENT RELATING THERETO

The Minister of Water and Sanitation intends constructing a government waterworks as contained in the Schedule hereto.

In terms of Section 110(1)(b)(iii) of the National Water Act, 1998 (Act 36 of 1998), interested parties are invited to submit written comments on the proposed waterworks and the environmental impact assessment by 30 June 2017. Comments must be submitted to the Director-General, Department of Water and Sanitation, Private Bag X313, Pretoria; Fax: 012 336 7399 and marked for the attention of Mr Menard Mugumo, Chief Engineer: Options Analysis.

SCHEDULE TO THE PROPOSED ZALU DAM GOVERNMENT WATERWORKS AND SUMMARY OF THE ENVIROMENTAL IMPACT ASSESSMENT

**A. ZALU DAM AND APPURTENANT WORKS****1) INTRODUCTION**

Lusikisiki Regional Water Supply Scheme supplies the town of Lusikisiki and 23 surrounding villages in the Ingquza Hill Local Municipality under the OR Tambo District Municipality in the Eastern Cape Province.

Growing water requirements of the local population have, over the years, exceeded the capacity of existing infrastructure. In addition to a capacity constraint, the operation of the scheme is severely hampered by frequent pipe bursts arising mainly from the ageing condition of the infrastructure.

The Department of Water and Sanitation recently undertook detailed planning investigations to establish the feasibility of building the Zalu Dam and appurtenant structures to augment water supply to the town of Lusikisiki and surrounding villages, and to stimulate socio-economic development in this economically depressed region of South Africa.

Together with local groundwater resources, the Zalu Dam will serve the area between Lusikisiki and the coast, extending from the Mzimvubu River in the south-west, around Port St Johns, to the Msikaba River in the north-east (see Locality Map). The bulk water distribution and reticulation network will be extended to reach more households.

**2) ZALU DAM AND APPURTENANT WORKS**

The proposed Zalu Dam and associated works is located on the Xura River, approximately 10 km north-west of the town of Lusikisiki, at co-ordinates 31° 18' 55.4"S, 29° 28' 37.3"E.

Zalu Dam has been designed to store a maximum of 19.8 million cubic metres of water and yield 10.9 million cubic metres at a 98% level of assurance. This yield is sufficient

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to supply potable water requirements amounting to 8.92 million m<sup>3</sup> per annum, to a population of 127 500, up to the year 2040. A volume of 1.45 million m<sup>3</sup> per annum is reserved for irrigated agriculture, subject to confirmation of availability of suitable soils. Groundwater supplies the balance of 0.95 million cubic metres per annum.

Isolated, discontinuous, pockets of potentially suitable agricultural soils occur along the Xura River downstream of the dam site. The areas with potentially good soils are small, broken up and scattered, which places severe limits to viability of formal irrigation. A total of 275.3 hectares made up of 5.4 hectares of highly suitable soils, 25.5 hectares of moderately suitable soils and 244.4 hectares of marginally suitable soils have been identified. The Eastern Cape Department of Rural Development and Agrarian Reform will undertake further soils investigations to confirm suitability for smallholder farming and community gardening. If irrigation does not happen, the reserved water allocation would be made available for potable use, thereby increasing the ability of Zalu Dam to supply potable water requirements up to the year 2060.

The location of the dam centre line, first identified in previous studies, was confirmed using topographical mapping as well as field reconnaissance. It was concluded that there were no better upstream dam wall locations available with regard to river valley shape (with a bearing on dam wall length), founding conditions, proximity to construction materials, and depth versus volume characteristics of the impoundment.

An earth core rockfill (ECR) design is recommended for the dam wall. Construction materials are sourced from quarries located within the dam basin as well as from the excavation for the side channel spillway. The design is for a 1.5 MAR dam.

Proposed Zalu Dam has the following characteristics:

DESCRIPTION	UNIT	NTABELANGA DAM
DETAILS OF STRUCTURE		
Non-overspill crest level	m.a.s.l	629
Full supply level	m.a.s.l	622.6
River bed level at dam	m.a.s.l	585
Minimum operating level	m.a.s.l	595
Maximum height to non-overspill crest	m	44
Crest length including spillway	m	323.9
Spillway crest length	m	25
1 in 200 year design flood	m <sup>3</sup> /s	625
Safety evaluation flood	m <sup>3</sup> /s	1 405
STORAGE		
Gross storage at full supply level	million m <sup>3</sup>	19.8
Storage below minimum operating level	million m <sup>3</sup>	2.5
Surface area of lake behind dam	km <sup>2</sup>	1.58
STREAM FLOW		
Natural mean annual runoff at dam	million m <sup>3</sup>	13.2

\* The above details are subject to final design which may require minor changes.

A cement grout curtain drilled along the core trench, at the bottom of the dam wall, is designed to curtail seepage through the foundation. Unavoidable seepage passing through the core is intercepted by filters placed directly behind the core.

The existing flow gauging station T6H004 on the Xura River downstream of the dam site will be replaced with an efficient structure. The gauging weir will be located

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adequately downstream of the return point of the side channel spillway to ensure established flow patterns at the weir. On the other hand, it must be located upstream of the first tributary so that dam releases are measured before mixing with tributary flow.

### 3) **BULK WATER SUPPLY INFRASTRUCTURE**

Existing infrastructure comprises a water treatment works, bulk distribution pipelines, storage reservoirs and reticulation network. Although the bulk water supply infrastructure is not part of the proposed government waterworks, funding will be provided through a Municipal Infrastructure Grant (MIG) or Regional Bulk Infrastructure Grant (RBIG), to enable the upgrading required for the full uptake of the additional water stored in Zalu Dam.

According to Technical Guidelines for the Development of Water and Sanitation Infrastructure storage has been designed to hold 48 hours of total system annual average daily demand (AADD). The expanded system has capacity to store 106 575 m<sup>3</sup>, up from the 5 335 m<sup>3</sup> existing capacity.

The old pipes were manufactured of asbestos cement in the last century and are now susceptible to frequent bursts and serious seepage. Asbestos cement is not recommended for replacement of the old pipes as this would expose workers to carcinogenic asbestos fibres through handling of the material. Recent scientific research has concluded that inhalation of asbestos fibres can lead to cancer. The pipes will be decommissioned and replaced with uPVC and steel material. A total of 174 km of uPVC piping and 7.5 km of steel piping will be installed.

The raw and clear water pumping stations will each be upgraded to 228 litres per second up from the present 32 litres per second. Energy requirements for pumping both from the treatment works and borehole installations is estimated to be 14 652 KWh/day when operating at full capacity.

#### 3.1 **Water Treatment Works**

Surface water quality analysis has indicated that surface water in this area is generally of a good standard. However, parameters such as colour, turbidity and alkalinity will require some treatment.

Since the presence of colour in drinking water is mostly caused by insufficient filtration, it is expected that an optimally designed, operated and maintained sand filter will be sufficient to reduce colour to within permissible limits.

High turbidity is generally caused by insufficient sand in the pressure vessel and/or operational flows higher than design flows. It is expected that an optimally designed, operated and maintained sand filter will be sufficient to remove turbidity to within permissible limits. Rapid gravity sand filters are recommended for treatment plants larger than 20 Ml/day, to allow close monitoring of the filter media and backwash.

Although low alkalinity is not harmful to humans and livestock, it does increase the potential for corrosion and aggression to concrete surfaces. Aggressive water results in high maintenance costs. Low alkalinity water is associated with low calcium and magnesium concentrations which give soft water. Although soft water has low potential for scaling, it makes soap to lather and difficult to wash off. If necessary alkalinity can be raised by a dosage of a hydroxide such as lime. In addition, a special concrete may be used for reservoir construction or reservoirs may be treated with surface coats that resist the aggression.

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Stratification within the dam reservoir results in decreasing water quality with depth. To deal with this problem, a multi-level intake structure is built to withdraw the best quality water at different times of the year.

Recommended treatment processes include:

- Flocculation;
- Oxidation
- Coagulation;
- Settlement in clarifiers;
- Rapid gravity filtration; and
- Disinfection with chlorine gas.

The existing 2.8 mega-litre per day treatment works at Xura River will be refurbished and a new 16.9 mega-litre per day treatment works constructed. The refurbished and new treatment works have a combined capacity of 19.7 mega-litres per day. Borehole installations supply an additional 2.6 mega-litres per day. Together, surface and ground water will deliver a total of 22.3 mega-litres per day.

### **3.2 Groundwater Treatment**

Local groundwater resources will be developed to supplement surface water supplies from Zalu Dam in order to improve reliability and lower the cost of supply. Groundwater contributes 0.95 million m<sup>3</sup> per annum to the system.

Of the 17 production boreholes identified four have been found to yield Class 1 quality water which does not require treatment. The other 13 boreholes however require some form of on-site treatment. Water from boreholes near to the bulk distribution pipelines might be blended with treated surface water. Remote boreholes will however be operated as stand-alone installations.

Stand-alone treatment systems for boreholes are available in the market and if installed would provide effective treatment of an already relatively good quality groundwater. The systems do however require technical skills for operation and maintenance, which may not be available at remote sites. This aspect will need special attention of the water service authority to ensure continuous, uninterrupted, supplies.

Treatment of borehole water must achieve low iron, chloride, bacteria and coliform concentrations to within permissible limits.

### **4) FUNDING REQUIREMENTS**

The cost of building Zalu Dam and associated works, upgrading and extending water treatment works, bulk distribution pipelines and storage reservoirs, and installation of boreholes has been estimated at R2 023 million including VAT and escalation to the year 2018. A breakdown of the cost is as follows:

1.1.1	Zalu Dam and Associated Infrastructure	R1 092 million
1.1.2	Groundwater Installation	R 14 million
1.1.3	Water Treatment Works	R 140 million
1.1.4	Bulk Water Distribution Infrastructure	R 777 million

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**TOTAL CAPITAL COST****R2 023 million**

A common measure for assessing economic efficiency of developing new water resources in South Africa is the unit reference value (URV), which is an expression of unit cost of water. The URV for the Zalu Dam project has been calculated as R3.43/m<sup>3</sup> at a discount rate of 8% per annum. This URV value compares favourably with similar projects undertaken by the Department of Water and Sanitation in recent years.

The URV for the bulk water distribution infrastructure, including the water treatment plant and borehole installation, is estimated at R0.60/m<sup>3</sup> at a discount rate of 8% per annum.

Investment in Zalu Dam and the associated bulk water infrastructure requires significant capital grant funding, as is normally expected on regional water supply schemes in predominantly rural environments. The project area is poor rural community characterised by very low household incomes, with 40.5% earning below the poverty datum. It is expected, however, that in the medium- to long term the economic stimulus injected by this investment will gradually empower households, through increased employment opportunities, to afford economic tariffs.

**5) SOCIO-ECONOMIC BENEFITS**

Construction and operation of Zalu Dam and the bulk distribution infrastructure hold great potential for improving livelihoods of the local communities and prospects for developing local entrepreneurs and human capital. The capital expenditure is expected to generate up to R1 billion in gross domestic product.

The construction phase has potential to open up 5 220 jobs per annum comprising 876 direct jobs, 3 184 indirect jobs and 1 160 induced jobs. Cumulative wages and employment benefits accruing to workers over the construction period amount to R440 million. This income benefit will reach a total 26 100 dependents of the labour force.

Operational expenditures are expected to stimulate further economic activity in the area. Gross domestic product is projected to grow by R1.12 billion during the service life of the scheme. Scheme operation has potential to generate 6 116 jobs per annum comprising 2 415 direct jobs, 2 471 indirect jobs and 1 230 induced jobs. Cumulative wages accruing to workers amount to R500 million over the service life. This income will reach 30 580 dependents of the labour force. International best practice for operation and maintenance can sustain these economic benefits indefinitely.

According to the 2011 Census, the population in the project area is 78 700. The population is projected to reach 127 500 and consume 5.4 million m<sup>3</sup> of water by 2040.

**6) OPERATIONAL REQUIREMENTS**

The scheme is configured to conjunctively supply surface water from Zalu Dam and groundwater from at least 17 boreholes. Water from boreholes near to the bulk distribution pipelines could be blended with treated surface water. Remote boreholes will however be operated as stand-alone installations.

Stand-alone treatment systems for boreholes, where these are installed, require specialised technical skills for operation and maintenance which may not be available at remote sites. It is recommended that OR Tambo District Municipality procure the required skills to ensure continuous, uninterrupted, supplies.

Pumping energy requirements for the scheme operating at full capacity have been estimated to be 14 652 kWh per day.

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Revenue from potable water sales must be ring-fenced for financing operation and maintenance of the treatment works and bulk distribution infrastructure. It is recommended that a competent operator be appointed to provide efficient service to the community.

**7) IMPLEMENTATION ARRANGEMENTS**

Government institutions with a role to play shall be invited into the governance structure. A Project Steering Committee drawing membership from these institutions shall be established to play an oversight role. The Department of Water and Sanitation is the project leader while National Treasury is expected to provide funding and any required guarantees on commercial loans. As the water service authority, OR Tambo District Municipality may decide to appoint either Ingquza Hill Local Municipality or Amatola Water as operator of the bulk water infrastructure. The Eastern Cape Department of Rural Development and Agrarian Reform together with the Department of Social Development are responsible for supporting the communities with the establishment of smallholder farming or community gardening.

Memoranda of agreement should be signed between the Department of Water and Sanitation and key role players to secure necessary commitments.

The Department of Water and Sanitation has an existing contract with Amatola Water for operation and maintenance of most dams owned by the department in the Eastern Cape Province. As a government waterworks, Zalu Dam is envisaged to fall in the fold of the existing contract.

A key milestone for implementation is finalisation of funding arrangements. It is important for the Department of Water and Sanitation to engage the National Treasury early on to avoid derailment of the programme.

The Regional Bulk Infrastructure Grant (RBIG) is recommended for funding the upgrading of water treatment works and bulk distribution infrastructure. OR Tambo District Municipality own the infrastructure and ownership remains with them after the upgrade although operation and maintenance might be contracted out to Amatola Water or other service provider of their choice. Operation of the reticulation network supplying households, however, is better placed in the hands of OR Tambo District Municipality or Ingquza Hill Local Municipality.

**B. SUMMARY OF THE ENVIRONMENTAL IMPACT ASSESSMENT**

(Reports available at [http://www.dws.gov.za/Projects & Programmes/Lusikisiki Regional Water Supply Scheme](http://www.dws.gov.za/Projects%20&%20Programmes/Lusikisiki%20Regional%20Water%20Supply%20Scheme))

The Department of Water and Sanitation recently completed an Environmental Impact Assessment (EIA) in terms of Section 110 of the National Water Act, 1998 (Act No. 36 of 1998) and in terms of the National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998). Authorisation was granted by the Department of Environmental Affairs on 25 July 2016 and no appeals were lodged within the prescribed period.

Environmental authorization stipulates commencement of construction within a period five (5) years from the date of authorisation. Authorization will lapse if the activity does not commence by 25 July 2021 or as subsequently revised.

Conditions of environmental authorisation must be observed both during construction and operation. To this end, an independent Environmental Control Officer, reporting to

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the Department of Environmental Affairs, is appointed to monitor compliance with conditions of authorisation during construction.

The findings of the six specialist studies conducted during the EIA are summarised as follows.

### **1) ECOLOGICAL IMPACT ASSESSMENT**

The study area is degraded and areas classified as Critical Biodiversity Area 1 and 2, where project infrastructure will have an impact, are in poor condition and generally overgrazed. A significant loss of biodiversity in these areas has already occurred and these areas should therefore be classified as areas of low to medium sensitivity.

The majority of the Zalu Dam inundation area has been degraded and impacted by human settlement. Consequently, these areas are classified as areas of low sensitivity.

Although degraded and infested with alien vegetation, the riparian zone, forest patches, wetlands and drainage lines still play an important role for ecological processes. These areas were therefore classified as having a high sensitivity.

Pipelines and access roads follow existing roads through areas that are already degraded and as a result many of the impacts will be avoided with effective management of the site as well as effective and monitored rehabilitation after construction.

Prior to construction and dam inundation it is recommended that an ecologist ground-truths the final pipeline route and inundation area to determine the presence of any of the species of special concern.

The operation phase consists of the commissioning of the dam wall and actual inundation of the dam basin. A search and rescue programme for slow moving and burrowing animals must be implemented before dam impoundment. A detailed plant removal and rehabilitation plan is recommended. The plan must be incorporated in the final Environmental Management Programme and must indicate the location of protected plant species that may be affected, removal, relocation and storage methods, rehabilitation species, re-vegetation methodology and re-vegetation monitoring. Individual plants that cannot be relocated at the time of removal should be moved to a nursery.

Overall, the impacts of the development will be low negative after implementation of mitigation measures. Residual impacts will mainly be associated with a loss of vegetation and habitat. Positive impacts include the active management of alien invasive vegetation on site.

### **2) SOCIAL IMPACT ASSESSMENT**

The socio-economic environment in and around the project area is characterised by poor levels of education, low income generation and potential, service delivery backlogs and economic depression. The main economic drivers include government services and agriculture which are severely under-developed. At a local level, the Ingquza Hill Local Municipality Local Economic Development Plan identifies a number of high potential industries for economic development, such as tourism, including what is termed catalytic projects such as the Wild Coast N2 Toll Highway. Catalytic projects are expected to unlock the economic potential of the area. The proposed Zalu Dam development is considered a catalytic project.

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Construction of Zalu Dam and associated works will result in a number of social impacts, both positive and negative. The following impacts have been identified:

1. Influx of job seekers will create conflicts between local labour and workers hired from outside the project area. The likely changes in social behaviour include increased crime rates, increased prostitution and other social ills. Prostitution and promiscuity in general will expose the communities to an increased risk of HIV/AIDS and other communicable diseases. On the other hand, an influx of job seekers leads to increased demand for local services which in turn provides a stimulus to economic growth.
2. Impact on health and general quality of life: The project will bring about improvements in the provision of water and upgrading of local roads. The downside includes noise and dust generated by the construction activity, reduced safety arising from high vehicular movements and potential run-away fires during construction. The operational phase poses the risk of drowning in the flooded dam basin.
3. Loss of land as a result of the Zalu Dam construction: The dam and associated works will be built on land previously owned by the communities. Loss of land is commonly associated with loss of access to natural resources.
4. Stimulation of economic growth: The development creates opportunities for employment and associated skills training both during and post construction. The injection of capital during construction will boost the local economy, and hopefully set it on a long-term growth trajectory.
5. Disturbances of grave sites along the routes of the pipelines.

The public engagement process showed that the project is highly desired due to the associated skills development and employment benefits.

### **3) AQUATIC IMPACT ASSESSMENT**

The aquatic impact assessment recorded more than 70 water resource-infrastructure interactions. Each of these will need to be authorised as part of the water use licence authorisation (WULA) issued by the Department of Water and Sanitation. Most of the interactions are where pipelines cross streams, drainage lines, but in a few cases the crossings are larger and will require more significant construction.

Areas of high sensitivity include un-degraded process areas such as rivers, wetlands and streams that are important for ecosystem functioning, including surface and ground water as well as animal and plant dispersal. This also includes areas that are not significantly impacted, transformed or degraded by current land use, and river reaches of major systems that are important for overall ecosystem functioning.

Areas of moderate sensitivity include areas that still provide a valuable contribution to biodiversity and ecosystem functioning despite being degraded; and smaller tributaries of larger river systems.

None of the impacts assessed remained high after mitigation, and assuming that the mitigation measures are correctly implemented, the aquatic environment downstream of the dam should not suffer any permanent negative impact. This requires that the dam operating rules be designed to maintain the ecological reserve within the river across the seasons.

### **4) HERITAGE IMPACT ASSESSMENT**

The heritage survey undertaken for the Lusikisiki Regional Water Supply Scheme recorded 87 heritage sites that may be affected by the project. Most of the heritage sites are human graves dating to the last 50 years. Many of these graves occur within



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fenced yards and should not be affected by any servitude. However, graves that fall within 50 metres of the new pipelines and roads will need relocation.

The archaeological sites that were noted are of low significance and do not require further mitigation.

**5) PALEONTOLOGICAL IMPACT ASSESSMENT**

The likely impact of the proposed development on local fossil heritage was determined on the basis of the paleontological sensitivity of the rock units concerned and the nature and scale of the development itself, most notably the extent of fresh bedrock excavation envisaged.

The field investigation confirmed that the area is underlain by the Silurian aged Natal Group, Carboniferous to Permian aged Dwyka Formation, Permian aged Ecca Group, Jurassic aged Dolerite and Quaternary aged Alluvium.

Due to the deep weathering of the Dwyka Formation and Ecca Group sediments, a Low Paleontological Sensitivity was allocated to the development. No severe impacts are envisaged. As a mitigation measure, the Environmental Control Officer for the project should be informed of the possibility that trace fossils might be exposed on the bedding planes of Ecca Group shales during deep excavations for the construction of the Zalu Dam and spillway. If fossils are recorded the palaeontologist, ECPHRA and SAHRA shall be notified and the fossils recorded according to SAHRA specification.

**6) VISUAL IMPACT ASSESSMENT**

The proposed Zalu Dam is positioned in such a way that the development is largely sheltered by both natural vegetation and the topography of the landscape. The overall visual sensitivity of the site is moderate, but if the mitigation measures are followed the overall impact would be low.

Some of the recommended mitigation measures include planning for buildings and structures associated with the Zalu Dam to be constructed in low lying areas to reduce visual intrusion on the surrounding landscape. Grassing the large barren areas of the dam wall and planting trees around the dam site is considered an effective screen to hide the dam wall from the nearby dwellings. Indigenous vegetation removed by the construction activity should be replanted to restore the aesthetic quality of the inundation area. The vegetation that has been replanted, including grassing and/or trees, should be maintained if necessary.

Although the Zalu Dam will dominate the visual landscape in its immediate proximity, it has been concluded that potential losses of scenic resources are not sufficiently significant to present a fatal flaw to the proposed project.

**7) SOURCING OF CONSTRUCTION MATERIALS**

An Earth Core Rockfill dam type is recommended for the Zalu Dam.

A range of construction materials such as sand, gravel and rock are required for the construction of the dam and associated works as well as access roads. As far as possible construction materials are sourced from the dam basin that is inundated once impoundment has commenced and from foundation excavations. Borrow areas within the dam basin cannot, however, provide sufficient impervious material for the core clay of the embankment dam, but large quantities of impervious material are available in borrow areas located within a 2 km radius downstream of the dam site. Approximately 32 800 m<sup>3</sup> and 64 000 m<sup>3</sup> of topsoil will be removed using an excavator from Borrow

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Pits 1 and 2 respectively. This topsoil will be stockpiled in demarcated areas and will be used to fill the excavation and level the slopes once mining is complete. The dolerite material will be removed using an excavator and transported to the Zalu Dam construction. A perimeter fence will be erected around the borrow areas and an access road constructed to Borrow Pit 1. Borrow Pit 2 is accessible via existing gravel roads.

An application has been submitted to the Department of Mineral Resources for a mineral licence for the two borrow areas.

**8) PUBLIC PARTICIPATION**

During the feasibility study, an initial stakeholder engagement process was conducted. This was a limited public participation process in support of environmental screening. A stakeholder committee was established and stakeholders drawn from local, provincial and national levels were engaged. The intention to develop Zalu Dam and associated works was communicated and project information provided to stakeholders. This engagement process paved way for the more comprehensive public participation during the EIA study.

The project was advertised in the Daily Dispatch early on during the EIA study. Notice boards were placed in Lusikisiki, Port St Johns and various locations in the study area. Surrounding landowners and affected residents were identified and notified of public meetings through ward councillors. They were handed out the Background Information Document (BID document). The draft Scoping Report was made available at the Library and Information Centre in Lusikisiki and Port St Johns Library for public review. It was also made available on the Environmental Assessment Practitioner's website.

Issues that were raised during public meetings and via emails and the post were recorded in the Issues and Responses Report compiled for the EIA study. The Issues and Responses Report was submitted to the Department of Environmental Affairs to inform the authorisation decision.

**9) ENVIRONMENTAL MANAGEMENT PROGRAMME**

An Environmental Management Programme (EMPr) has been prepared and submitted together with the Environmental Impact Report for authorisation. The EMPr, which sets out conditions of authorisation applicable during construction and operation, shall be updated for approval by the Department of Environmental Affairs before implementation.



**MRS NP MOKONYANE  
MINISTER OF WATER AND SANITATION**

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Government Notice



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